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Fishes learn at different rates and take after their mothers



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Fraser Januchowski-Hartley is a coral reef fish ecologist, with over a decade of experience working on coral reefs. His research has focused on the ecological dimension of coral reef socio-ecological systems, and its importance for conservation and management. These research topics cover: coral reef conservation, ecology and biogeomorphology; interactions between fishing, management and fish behavior; and impacts of ecosystem services on human wellbeing. Currently he is a Sêr Cymru II research fellow at Swansea University, UK.

Fishery pressure can act to increase fish wariness, which may have multiple impacts. For example, if fisheries select for fishes that are wary, or most able to learn, potential fisheries impacts could include reduced catchability, rapid stock depletions at the start of fishing seasons, and potential fitness consequences. There is considerable debate about the genetic heritability of wariness and propensity to learn these behaviours, with evidence that learned behaviours may erode over time. Using the zebrafish *Danio rerio*, I am conducting a multiple generation experiment on the heritability of learning in fishes. At maturity, zebrafish are 'trained' to avoid a net, with emergence tests and simulated fishing using a standardised capture technique. Emergence time, initial reaction to a net, and sweep captured were recorded. After 5 training sessions (separated by 5 days), fishes were left for 10 days, before splitting into fishes into 'quick', 'moderate' and 'slow' emergers, based on order of emergence. Generation 2 was bred within and across emergence behaviours (9 groups), and underwent training in August 2019. In generation 1 there was a high retention of the learned wariness after the training period, with ~ 60% of fishes taking more than one minute to emerge in an emergence test 10 days post-training. In the second generation, a pattern of increasing emergence time with training was still apparent, although the rate of change showed differences related to maternal behaviour; fishes whose mothers retained learned behaviours showed quicker responses to the training scenario. I am currently raising generation 3 to further assess the impact of selection pressure. However, my initial results suggest that fishes are able to learn appropriate fishery avoidance behaviours, which are likely to lead to phenotypically distinct populations.